**Unit 4: Cell Communication, Cell Cycle and Meiosis**

**Read:** Chapters 11, 12 and 13

**Videos**: Bozeman - #28, 36, 37, 38 , 39

Bozeman Lab Videos: #3 Mitosis and Meiosis

**Objectives**:

1. Describe the different ways cells communicate with each other.
2. Explain how immune cells, antigen-presenting cells, helper T-cells and killer T-cells use cell-to-cell contact.
3. How do plant cells use plasmodesmata for cell to cell communication?
4. Explain how local communication over short distances is used with neurotransmitters, quorum sensing in bacteria, morphogens in embryonic development and plant immune responses.
5. Explain how signals released by one cell can travel long distances to target cells of another type.
6. How do signal transduction pathways work?
7. Describe why signal transduction pathways are under strong selective pressures?
8. In unicellular organisms, how do signal transduction pathways influence:
   1. quorum sensing
   2. yeast pheromones in reproduction
   3. bacterial movement in response to external stimulus
9. In multicellular organisms, how do signal transduction pathways coordinate activities within cells that support the function of the organism as a whole:
   1. Epinephrine stimulation of glycogen breakdown in mammals
10. Describe the difference between stimulatory and inhibitory signals.
11. Describe how signals are received by cells. Different types of receptors.
12. What kind of relationship does a receptor have with its signal molecule?
13. What happens to the protein when the receptor binds? Describe the following:
    1. G-protein linked receptors
    2. Ligand-gated channels
    3. Receptor tyrosine kinases
14. Explain the concept of signaling cascades.
15. Describe the use the example of cAMP as a second messenger in a signaling cascade.
16. Explain the effects of phosphorylation on a signaling cascade.
17. Explain the effects of methylation on protein modifications on a signaling cascade.
18. Explain the events of all stages of the Cell Cycle.
19. How is the cell division controlled by MPF (mitosis promoting factor)? Or PDGF (platelet-derived growth factor)
20. What are cyclins and cyclin-dependent kinases? How are they involved in controlling cell cycle?
21. Explain what cancer is and how it develops in an organism.
22. Explain the events of all stages of mitosis.
23. Be able to track the chromosome and chromatid number through all stages of mitosis.
24. Explain when the events of DNA replication, chromosomal alignment and separation are accomplished during the cell cycle.
25. How does mitosis differ in plant cells vs. animal cells?
26. Know the terms diploid and haploid.
27. Track the chromosome and chromatid number through all stages of meiosis.
28. How and why does meiosis occur?
29. Explain the events of all stages of meiosis.
30. How does meiosis increase genetic variation, thus, supporting evolution?
31. Compare the process of mitosis to the process meiosis.
32. How and when are DNA replication, chromosomal alignment, and chromosomal separation accomplished during a meiotic cell cycle?
33. Describe the purpose and outcome of the Mitosis Data analysis and Sordaria Activity.